DOCUMENT RESUME

ED 458 188 SP 040 090

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TITLE Effects of Using Graphic Notations on Creativity in Composing Music by Australian Secondary School Students.
PUB DATE 2000-12-00
NOTE 9p.; Paper presented at the Annual Meeting of the Australian Association for Research in Education (Sydney, Australia, December 4-7, 2000).
AVAILABLE FROM For full text: http://www.aare.edu/00pap/auh00052.htm.
PUB TYPE Reports - Research (143) -- Speeches/Meeting Papers (150)
EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Creativity; Foreign Countries; Grade 7; Junior High School Students; Junior High Schools; Learning Strategies; Males; *Musical Composition
IDENTIFIERS Australia; *Graphic Representation; *Music Notation

ABSTRACT

This study investigated whether composing music with graphic notations would make a significant difference in creativity in composing music as compared to composing music without graphic notations. Participants were 47 male, Australian, seventh grade students attending a private school. Students were divided into two equal groups (an experimental group and a control group) based on their musical grades, formal and informal musical experience, and musical aptitude. The experimental group received instruction on how to use graphic notations for composing music, while the control group received no such instruction. All students were asked to compose and perform. The students' compositions were videotape-recorded. Four expert judges evaluated the creativity of the compositions using three criteria (being original, structured, and musical) on a five-point rating scale. Results indicated that the experimental group students' creativity scores were significantly higher than were the creativity scores of the control group students. (Contains 32 references.) (SM)

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# Effects of Using Graphic Notations on Creativity in Composing Music by Australian Secondary School Students

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## Abstract

*Theory and research in visual imagery and creativity have shown that use of graphic notations could enhance creativity in composing music. However, no such study has been conducted with Australian students. The purpose of the study was to determine if composing music with graphic notations makes a significant difference in creativity in composing music when compared to composing music without graphic notations by Australian secondary school students. Subjects were 47 seventh-grade students (all male) attending a private school in Sydney, Australia. The students were divided into two equal groups of Experimental (n = 22) and Control (n = 25) group on the basis of their musical ability. The Experimental group received an instruction on how to use graphic notations for composing music, while the Control group did not. The students' compositions were videotape-recorded by the researcher for judges' evaluations. Four expert judges evaluated creativity of the compositions using 3 criteria, i.e. Being 1) Original, 2) Structured, and 3) Musical, and 5-point rating scales. The results showed that the Experimental group's creativity scores were significantly higher than the Control group's ($p < .05$). Therefore, the results confirmed the findings by Auh & Walker (1999) with Korean secondary school students in Korea. Implication: Teachers should use graphic notations to stimulate creative thinking in instructions on composing music.*

## INTRODUCTION

What composing methods would make significant differences in creativity in composing music? While creativity researchers in music have studied on many other aspects of musical creativity, such as how to assess musical creativity (e.g. Baltzer, 1988; Webster, 1987), significant factors of musical creativity (e.g. Auh, 1996, 1997; Baltzer, 1990; Kratus, 1994; Schmidt & Sinor, 1986; Swanner, 1985), how creative thinking works in music classes (e.g., Levi, 1991), in case studies (e.g. Carlin, 1999; Freed-Garrod, 1999), and in Western classical composers (Simonton, 1987, 1993), and compositional strategies (e.g. Auh, 1999; Auh & Walker, 1999; Colley et al., 1992; Davidson & Welsh, 1988), the above question has not received due attention from researchers. There are experience-based answers to the question, such as: 1) Use stories, such as stories from children's story books and from their daily life experiences, to be described in music compositions, 2) Use pictures, both concrete and abstract kinds, to stimulate visual images through their colors, shapes and moods, 3) Suggest favorite scenes by students, such as a stormy night or trips to the universe, which would motive them to composing music, 4) Use soundscapes to open their ideas of composing music into collections and organizations of interesting sounds, and so on. However, few systematic studies have been conducted investigating whether the methods make significant differences in creative thinking in music and how each of the methods operates.

The researcher chose to investigate the use of graphic notations in relation to creative thinking in music, because, first, there is mounting evidence that visual imagery plays an important role in creative thinking in music (Walker, 1978, 1985, 1987, 1990, 1992) and in general (e.g. Gruber & Wallace, 1999). Walker's studies showed the connections between visual metaphors and creative thinking in music. Gruber (1978, 1981) showed that Darwin used drawings of branches of a tree, later called "Tree of Nature", to conceptualize evolutions of species, which resulted in his Evolution Theory. Graphic notations would work to *visualize sounds* , which would make it more concrete and easier for students to make musical ideas and develop and refine them. Second, in Auh & Walker's (1999) study with Korean secondary school students in Korea, it was found that students using graphic notations for composing made up more creative compositions than those using staff notations. However, no study of this kind has been conducted with Australian secondary school students. Third, while the composition methods listed above are for motivating students to composing music and stimulating thinking *about* composing, they cannot grasp tonal and rhythmic patterns used in compositions, which graphic notations can. Graphic notations function as a tool to represent the invisible sounds in the visible forms. Use of graphic notations in music classes is not new in Western countries. Graphic notations have been used as an alternative to staff notations for notating music, but hardly as stimuli for composing music using visual imagery.



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### Purpose

The purpose of the study was to determine if composing music with graphic notations makes a significant difference in creativity in composing music when compared to composing music without graphic notations by Australian secondary school students.

## METHODS

### Subjects

Subjects were 47 seventh-grade (all male) students attending a private school in Sydney. Seventh-grade was chosen for this study to compare results of this study with those found in Auh & Walker (1999), who employed seventh-grade Korean students living in Korea. Only male students were available for seventh-grade in the private school, thus an investigation of female students is left to a further study. Their age ranged from 12 to 13. Their music classes consisted of playing electronic keyboard and playing musical instruments (e.g., orff instruments, band instruments), and some students had private music lessons in school outside of the music class. The socio-economic level of the students was high to middle. Cultural backgrounds of the students need to be mentioned, because 1) Australia is an extremely multicultural society such that, if students of a different school in Sydney had participated in this study, their cultural backgrounds could be very different from those found in this school, and 2) culture could be a factor for musical creativity in composition (e.g. Campbell, 1990; Csikszentmihalyi, 1988, 1999; Kuo, 1996). 87% of the students (41 out of 47) were from Western cultural background, and the others were Indian, Asian, or Middle Eastern.

### Procedure

Procedure of the data collection was as follows:

1. The researcher explained to music teachers and students about the study and the composition tests that students are going to take. Parental Permission Forms were sent to parents of the students by the teachers.

2. Four kinds of data were collected: 1) students' music grades by their music teachers, 2) students' formal musical experience, 3) students' informal musical experience, 4) students' music aptitude. Formal Musical Experience Questionnaire and Informal Musical Experience Questionnaire, both devised by the investigator, were used for measuring students' musical experiences. Music aptitude was measured by Gordon's (1988) Musical Aptitude Profile-Melody and Meter tests, a standardised music aptitude test, which took 40 minutes in total. The data consisting of students' musical achievement, experiences, and aptitude should represent students' musical ability in general.

The data were used to divide the students into *2 equal groups* . Dividing students into two equal groups was important, because, if any significance is found in musical creativity in composition, that is not due to different levels of musical achievement, musical experiences, and musical aptitude of the students, but due to their different creativity levels. Using the data, the students were divided into Experimental (n = 22) and Control (n = 25) groups, who were grouped into 10 to 14 students for composition warm-up and tests, resulting in 2 Experimental groups and 2 Control groups. From previous experiences (Auh & Walker, 1999), grouping students into small numbers was found appropriate for composition tests like this.

3. A 40-minutes warm-up session was given to both the Experimental and the Control groups. During the warm-up session, the Experimental group received instruction in how to use graphic patterns for composing, composed a short piece using graphic patterns, notated their music with graphic patterns on blank sheets, and performed their compositions. A set of graphic patterns, developed by Walker (1976, 1978), were used. On the other hand, the Control group was simply given time to compose and perform. They were given sheets, in which one side had music staff lines and the other side was blank. They were asked to notate in any way they like. Thus, the only difference between the Experimental and the Control groups was use of graphic patterns for composing music.

Students were allowed to choose a musical instrument for composing. That was so, because students would make a more creative composition when they are familiar with their musical instrument than when they are not. The most frequently used musical instrument by the students was Orff bar instruments, i.e, xylophone, metallophone, and glockenspiel (see Table 1). The bar instruments were the instruments used for music classes at the school, and were chosen mostly by many students who do not play a specific instrument. Brass instruments, such as Trumpet, Saxophone, French Horn, and Tuba, were the next frequently used by the students, which seem to reflect male students' instrumental preference for Brass. Students who chose a piano for composing were not necessarily those taking piano lessons, but simply chose a piano, because they learned electronic keyboard playing in music class and electronic keyboard was not available at the testing room. Students who chose violin, cello, and clarinet as well as brass had private music lessons on their instruments.

***Table 1. Musical Instruments Used for Composing by the Students***

| *Category of Musical Instruments* | *Number of students* | *Names of the Instruments* |
|---|---|---|
| String | 4 | Violin, Cello, Guitar |
| Wood Wind | 3 | Clarinet |
| Brass | 7 | Trumpet, Saxophone, French horn, Tuba |
| Percussion | 4 | Drum, Cymbal, Timpani |
| Keyboard | 7 | Piano |
| Orff Bar instruments | 21 | Xylophone, Metallophone, Glockenspiel |
| Jazz instruments | 1 | Bass guitar & Amplifier |

4. Composition tests were given to the Experimental and the Control groups. The Experimental groups were reminded how to use graphic patterns for composing, and then 30 minutes were given for composing. Thirty minutes were observed to be long enough for seventh-grade students' composing in previous studies (e.g. Auh & Walker, 1999). The students were told that they would be asked to perform their compositions after the 30 minutes and their performance would be videotape-recorded. When students finished composing, each person came to the front and performed their composition, which was videotape-recorded by the researcher.

5. The students' compositions on videotapes were evaluated by 4 expert judges. Three criteria for musical creativity were given to the judges, which were based on the generally-agreed definition of creativity among creativity researchers (Sternberg & Lubart, 1999) and were successfully used with high interjudge reliabilities in previous studies (Auh & Walker, 1999; Auh & Johnston, 2000). The criteria are as follows:

***Being Original:*** Is the composition original, unique, new, and different from the

compositions that Year 7 students would probably make?

***Being Structured:*** Is the composition well-structured, well-organized, and not

sound random?

***Being Musical:*** Is the music musical, i.e., not a collection of rubbish, noisy

sounds but called "music" judged by your expertise in music?

The judges used 5-point rating scales and were asked to describe why they gave a certain rating for each criterion in each composition. Asking judges for such reasons would increase validity of the judges' ratings. Each judge's evaluation of the compositions took about 3 hours.

**Analysis of Data**

The judges' ratings for creativity served as quantified data for musical creativity in composition. *Pearson product-moment correlations* were used to compute interjudge reliabilities of the creativity ratings. Percentile plot graphs were used to show distributions of percentile ranks of creativity scores by the Experimental and the Control groups. *t* -tests were used to compute differences in musical creativity in composition between the Experimental and the Control groups.

## RESULTS

**Interjudge Reliability**

Interjudge reliabilities of the 4 judges' ratings for musical creativity were unexpectedly low, ranging from .40 to .53. Mean Interjudge reliability of the ratings was: $r$ = .48. Causes of the low interjudge reliability will be investigated in a further study using judges' reasons for their ratings. In order to see where such disagreements occurred among the judges, the judges' ratings for the Experimental group were separated from those for the Control group, and interjudge reliabilites for each group were computed. As expected, disagreements among the judges were stronger for the Experimental group than for the Control group. Mean interjudge reliability for the Experimental group was $r$ = .39, while that for the Control group was $r$ = .53. This suggests

that judges seem to have different opinions for some of the compositions in contemporary musical styles which resulted from use of graphic notations.

**Descriptive Statistics & Percentile Plots**

Table 2 shows descriptive Statistics of scores of musical creativity for the Experimental and the Control groups. Sums of the four judges' ratings were used for Musical creativity scores, which consisted of Total Creativity as well as each of the criteria. The Experimental group showed higher Mean scores of Total creativity than did the Control group. Mean scores of the Experimental group for the 3 criteria were all higher than those of the Control group.

Figure 1 shows distributions of percentile ranks of the creativity scores, i.e. Total Creativity as well as Original, Structured, and Musical. Visually speaking, the Experimental group's percentile ranks (blue colour) are higher than the Control group's (red colour) in all of the four percentile plots. However, if you look closely, lowest and highest percentile ranks of the Control group in Original criterion are higher than those of the Experimental group, which could nullify significant differences between the Experimental and the Control groups. That leads to *t* -test results of differences in musical creativity.

**Differences in Musical Creativity in Composition**

*t* -test results (see Table 3) showed that the Experimental group's musical creativity was significantly higher than the control group's ($p$ <.05). This suggests that use of graphic notations made a significant difference in musical creativity in composition, the Experimental group producing more creative compositions than the Control group. Differences in ratings for the three criteria were also computed. The Experimental group's ratings for Structured and Musical criteria were significantly higher than the Control group's. However, a difference in ratings for Original was non-significant between the two groups.

*Note: The full score for Total Creativity was 60, and its lowest score was 12. The full score for each of the criteria was 20, and its lowest score was 4.*

## DISCUSSION

*The results of this study confirmed findings by Auh & Walker (1999) that use of graphic notations made a significant difference in creativity in composing music by secondary school students. In Auh & Walker (1999), the Experimental group received the same instruction for composing music using graphic notations. In their study, no gender difference was found in musical creativity. Thus, in a future study, when data with Australian female secondary school students are added to the current data to compute differences in musical creativity by use of graphic notations, the same results are expected.*

### *Conclusion*

*The use of graphic notations for composing music made a significant difference in creativity in composing music; the Experimental group showed significantly higher musical creativity than the Control group did.*

### *Implication*

*Teachers should be encouraged to use graphic notations for composing music, which could stimulate creative thinking in music.*

### *Further Studies*

*The following further studies are suggested: 1) What musical features are observed in compositions using graphic notations? Compare the musical styles of compositions using graphic notations with those of compositions not using them. 2) How did the Experimental group notate their compositions using graphic notations? How did the Control group notate their music? 3) Why were interjudge reliabilities of this study so low? Compare the comments and ratings by the four judges.*

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***Acknowledgement***

*The researcher would like to express her sincere appreciation for those who helped for this research project: James Allington, Bradley Merrick, and Jodie Pritchard at Barker College for their collaboration for data collection; and Prof. Robert Walker at University of New South Wales, Dr. Anne Power at University of Western Sydney-Nepean, and Dr. Peter DeVries at Unviersity of Technology-Sydney for their valuable comments on and evaluations of the students' compositions.*